



Sensor Consortium: Consortium for Security and Medical Systems
Department of Electrical and Computer Engineering
College of Engineering and Applied Sciences, SUNY Stony Brook

Newsletter, June 2005

In this newsletter we are reporting the news that occurred in the April-June 2005 period.

Educational Component

1. Sensor Consortium Project Competition

The Sensor Consortium Project Competition took place on May 23, 2005 in the new Wang Center of Stony Brook University. This competition is a crucial part of the consortium educational component and has its goal to evaluate independent projects developed during two semesters of the E-Team activities. The unique feature of our E-Teams is that it consists of undergraduate students from four Long Island colleges, the Consortium Educational Partners. Each team is led by a graduate student from the Stony Brook Electrical and Computer Engineering (ECE) Department and supervised by a member of the ECE faculty.

Four projects from four E-Teams were competing for the first prize. The projects' technological innovation and business plans were judged by a panel of experienced entrepreneurs, professional service providers and investors, including by a past winner of the MIT \$50K, the oldest and most prestigious student entrepreneurship competition.

About a week before the actual Competition day, each group of students from other Educational Partner institutions made presentations of their projects at their home colleges. The primary purpose of these presentations is to disseminate information about the Consortium and to inspire more students from our educational partners to participate in next year's activities. These presentations also helped students better prepare their parts at the Competition.

Time allocation for presentation of each project was 30 min, 20 min for the student presentation and 10 min for questions. Each student of the E-Team speaks about his/her work on the project.

This year the Consortium E-Team Competition was carried out concurrently and jointly with the Stony Brook DARE Competition (See Research and Technology Transfer section below).

a) Judging Panel

A panel of five judges was formed whose function was to select the best project. The names of the judges, their affiliations and a brief description of their business activities are listed below.

Herman Fialkov, Special Partner, Newlight Associates.

Mr. Fialkov is a pioneer in the high technology and the venture capital fields. He was the founder and President of General Transistor Corp., one of the earliest semiconductor

companies in the U.S., which he merged with General Instrument Corporation in 1960, serving as Senior Vice President of General Instrument through 1968. As one of the earliest venture capital investors in the U.S., Mr. Fialkov developed over 40 technology companies through successful investments that included Intel, Teledyne, Valtec, Xynetics, Qantel and Four Phase Systems. Mr. Fialkov was a founding General Partner of PolyVentures and also served as President and later as Chairman of Standard Microsystems Corp. Mr. Fialkov holds a Bachelor's degree in Engineering from NYU.

Edward Fritz, Director, NYS Small Business Development Center, Stony Brook University.

Ed has been a manager for over 30 years in both municipal government and the financial community. He has also been a business professor at various Long Island colleges. Having served previously as Business Advisor at the Stony Brook Small Business Development Center, he is very knowledgeable of the role the Center plays in Long Island's economy.

Philip Palmedo, Chairman and Founder, International Resources Group.

IRG is an internationally recognized professional services firm that has completed over 650 contracts in 134 countries. Dr. Palmedo, who holds a Ph.D. in Nuclear Engineering from MIT, has more than 30 years of experience in energy research, policy analysis, and the design of technology-based economic development. Dr. Palmedo served as President of the Long Island Research Institute from 1991 to 1999 and has participated in the start-up of numerous software, technology, and financial companies.

Steve Winick, Partner, Topspin Partners

Prior to joining Topspin, Mr. Winick most recently served as CIO of the \$2B Security Group at Honeywell, Intl. He had been with Honeywell (and the Ademco division of Pittway Corp., before its acquisition by Honeywell in 2000) for over 21 years as CTO of the security business, as well as founder and president of the wireless communications services business. He received a B.S. in Economics from the Wharton School of the University of Pennsylvania in 1971 and a B.S. in Electrical Engineering in 1972, also from Penn. He received his J.D. from Georgetown University Law Center and is a registered Patent Attorney.

John Pyrovolakis, Minos Partners

John Pyrovolakis raised seed capital for Collegescope - an application service provider of online admissions tools for colleges and universities - shortly after the MIT \$50K Competition. After forging partnerships with MIT Sloan and Harvard Business School, Collegescope partnered with the GMAC, won an RFP from the Educational Testing Service (ETS), beating out substantially larger competitors such as the Thomson Corporation (NYSE: TOC, TSX: TOC). The Thomson Corporation then made a bid to purchase Collegescope, which Collegescope accepted in 1998. Collegescope was covered on the front page of the NY Times "Circuits" section, the front page of the Boston Globe's "Education" section, was one of CNET's "sites of the year" in 1998, and an interview of Mr. Pyrovolakis aired on FOX, ABC, CBS, NBC, and the Sci-Fi Channel. After selling Collegescope, Mr. Pyrovolakis has worked on various projects - including consulting for the US Department of Treasury, the U.S. Department of Education, MasterCard International, and Suntrust Bank - and in 2002 founded a company that is currently in stealth mode.

b) Suggested criteria for the evaluation of the E-Team projects, to be used by the panel judges

The Consortium staff suggested ten criteria to be used as a guideline for judges for evaluating the projects, five business-related and five technical. Each criterion carries 10 points; the total score of both the business and technical criteria determines the winner of the competition.

Business criteria

1. Is the business opportunity for this project viable and realistic? How does this product improve upon similar products already on the market?
2. Is the business defensible from competitors? Have potential competitors been identified? Is there a tentative plan that outlines defensive strategies?
3. Has a thorough analysis of the current market been done? Has a market niche for the product been identified and a customer base determined?
4. Is the business plan clearly and well presented? Is the business plan explicitly informed by the market analysis?
5. What are business projections for next five years? Have market and other factors been identified that might impact the business plan over the next five years? Does the plan include potential actions to moderate or mediate these?

Technical criteria

1. Does the presentation include a working prototype/component? If not, does the presentation include extensive diagrammatic plans for a prototype/component and evidence of model testing?
2. Is the project innovative? Does the project represent a technical challenge? Is the project patentable?
3. How well is the technical content of the project presented?
4. Have the design constraints of this project been determined? Were they well presented? Were they resolved in a satisfactory way?
5. Beyond its technical merit, what broader positive impact will this project have on society?

c) Winning Team

The panel awarded the first prize by unanimous decision to the *RFID Sensor Networks* project. The E-Team project participants are underground students Shigang Yuan (SB), Viraj Mehta (Suffolk), Eric Hjelm (Hofstra) led by Manesh Vemula, a SB graduate student. The faculty advisors for the projects are Profs. Petar Djuric and Mónica Bugallo.

Project Description: Radio frequency identification (RFID) is a new technology that provides automatic object identification and/or tracking by using electromagnetic radiation at radio frequencies. A basic RFID system is composed of RFID readers and RFID tags. The circuitry used in the reader is used to generate signals that query desired tags and to “power” the RFID tags. In turn, if necessary, the RFID tags reflect the reader signals and send information that is processed by the reader. Based on the received signals from several readers, the system can locate or track the desired tag. Typically, the information used for location of the tag is in the distances of the tag from three or more readers. The location and tracking of tags can be accomplished by adding sensors to the RFID system and thereby, building a wireless sensor network. The idea is to allow the sensors to sense only tags in their vicinity and report the detected tags to nearby readers. From the response of the sensors, the readers would be able to locate or track the desired tag.

The aim of this project is to explore the feasibility of building an RFID sensor network for use in hospitals. The objective is to use readers and tags available from the current market and build a sensor that will become an essential component of the sensor network. In the design of this sensor, currently available protocol standards for

RFID communication will be used. The project will also include work on issues related to sensor deployment and investigation of challenges for achieving a robust realization of a large and complex sensor network.

RFID systems in hospitals can be employed for continuous tracking of patient's location, real time tracking of doctors and nurses, tracking of expensive and critical instruments and equipment, use of the patient's RFID tag to access patient information for review and update through hand-held computer (PDA), and drug tracking.

For this project the team has carried out experiments where a transmitted signal by a reader is backscattered by a tag and then captured by a sensor that showed the feasibility of the proposed system. They designed a protocol of the proposed system, which is a combination of the Matrix protocol (for tag singulation) and CDMA-type signaling from the sensor to the reader, and designed and implemented the power supply and the analog front-end of the tag.

Each undergraduate student contributed in the project. One of them has prepared a SIMULINK model for the overall system, which is used to study the characteristics of the system. Another student has written a MATLAB-based GUI for testing methods for tag localization. Finally, a third student simulated the protocol.



Photograph during the project presentation

2. Organizational

a) *Post-Competition Blues.*

The Consortium staff met with Dr. Scheidt, Director, Office of Economic Development, to analyze experience of this year Competition. We all felt that a strict common protocol should be developed for the project presentation. Our preliminary decision was to break the presentation in two parts: technical and business. The technical part of presentation can be run as an industry fare, with four E-Teams at their stands each presenting a demonstration of their project, judges and other participants milling around, asking questions. It can also include a video with technical details. The second part is the business plan presentation. The protocol may include a requirement of Small Business Development Center consultation and some form of endorsement of the business plan in advance of presentation. In their presentations the teams should regard their primary ultimate objective as producing a salable product and must answer the question “*Why will this venture succeed?*”

We also discussed preparation of the judges' panel for the Competition: introducing the evaluation criteria before the competition, providing business plans to judges prior the competition day. Later in the year we should address the presence of media at the Competition.

b) Meeting with Prof. Gerrit Wolf: Changes in 2005-2006 business course

This year experience revealed a flaw in the timing of the business course. The course was given in the fall semester, and the E-Teams are left for the most crucial period of the project, the spring semester, without business guiding. For the next year, we propose to have the course to be extended to the Competition with theoretical part given in the first semester, and a practical guidance in the business plan given during preparation to the Competition in the second semester. We met with Prof. Wolf of the Harriman School of Management & Policy to discuss the arrangement of the course. Prof. Wolf suggested that the actual guidance was carried out by his MBA graduate students under Prof. Wolf supervision. Each E-Team project will be guided by a group of Prof. Wolf's business-major students.

c) Consortium Educational Partners Summer Meeting

The meeting is schedule the first part of July with the following agenda:

1. Annual Report to NSF (with inputs from all educational partners)
2. Proposed change in annual competition format
3. Publication - Journal of Engineering Education
4. Student recruitment for next year
5. Comments and suggestions.

Research and Technology Transfer

1. Joining forces with the DARE

To strengthen the Consortium ties with the R&TT SBU community and to expose the E-Team projects to the processes of Technology Transfer, the Consortium took part in the Stony Brook DARE Competition (<http://www.sunysb.edu/research/dare.html>) sponsored by both Technology Transfer/Licensing and Economic Development Offices, both under SBU Vice President for Research. The DARE Competition that also made its debut this spring is designed to encourage students at all levels in the Stony Brook University community to act on their talent, ideas and energy to create successful start-up companies of tomorrow. Itself a startup, this year the DARE Competition makes one \$5,000 award to the winning team of student entrepreneurs whose business plan for a new technology-based venture shows significant promise for viability and growth.

The Sensor Consortium and Stony Brook DARE competitions share the idea of promoting the entrepreneurship in the student community. This was the reason that the staff of the two events decided to join forces, combine the two competitions and share the pool of judges (see joint announcement for the Competitions at the Sensor Consortium Schedule of Events page (<http://www.ece.sunysb.edu/~sensorconsortium/schedule.htm>)).

2. Patent filing by the winning team

One of our E-Team projects, the RFID network, under the guidance of Prof. Djuric has applied for a patent for his team's invention.

Furthermore, Prof. Wendy Tang and Dr. Michael Gouzman also plan to file a provisional patent for their project on a wireless health monitoring system.

Outreach and Dissemination:

1. Effect of Consortium activities on students of the Education Partner Institutions

Below this effect is evaluated by Prof. Joseph Betz of Farmingdale State College:

The Consortium program enhanced students understanding in the non-technical of product development. From the beginning, developing the right product idea was the most serious challenge the engineering students face. When the technical aspects of the project had been defined, developing the business model and business plan became a major challenge for students. Current academic programs don't prepare students for these types of problems. This year's exercise exposed to the faculty the importance of entrepreneurial knowledge. We hope to incorporate the Consortium experience into future course and curriculum development at Farmingdale....

I believe that to better succeed, the E-teams have to be more academically diversified. All this year's E-team students were recruited from technical and engineering backgrounds. Future E-teams should be drawing on a variety of academic programs and reflecting a pattern of successful small businesses....

The success of each team was helped by the young people's ability to work together. The teams tended to have an informal "as needed" approach to problem solving. Very soon in the project they instinctively developed their work roles. Students with very strong technical skills were usually assigned the roles requiring the use of their skills. Students with weaker technical skills tended to play roles in areas in which no one had experience. In short, if you were not the dominant knowledge and skill team player you most likely were playing a role for which you were not prepared....

It was amazing to observe how E-Teams tasks evolved from an objective engineering problem solving to a highly subjective and difficult-to-define problem of product fit in a human cultural value system which ultimately is the measure of the product success. This experience is not at all about just having a great technical idea and the skill to implement it, rather it is about developing a team able to bring this idea to a completion in a market economy.

Prof. Simona Doboli, Sensor Consortium project coordinator at Hofstra University writes about her students' experience:

...The students from Hofstra had an excellent experience in entrepreneurship that complemented very well their technical background. They learned a lot about the steps to start a company, the patenting process, the business plan. The competition offered them invaluable feedback as it realistically modeled the situation faced by anybody who needs investors to start a company. Students developed entrepreneurial and business skills which are missing from the standard college curriculum.

All Hofstra students were positive about the Sensor Consortium scholarship. They all thought the entrepreneurship course and seminars were very informative and useful and introduced them to a dimension never seen before.

Hofstra University is very active in introducing entrepreneurial experiences and/or curricula to students across the campus. The Sensor Consortium Partnership is the first such activity in the Computer Science Department. We are learning a lot from this experience and are planning to

use it to develop long-term curriculum that enhances students' awareness to entrepreneurship activities.

2. Competition Press Release

To disseminate the information about the Competition the Consortium contacted the Public Relation Department of Stony Brook University. The following press release appeared in local newspapers (Long Island Business News, Newsday, Long Island Voice, Long Island Times, Three Village Times and Farmingdale Observer):

**STONY BROOK HOST TO ENGINEERING COMPETITION
TO DEVELOP SKILLS IN TECHNOLOGY ENTREPRENEURSHIP
*Farmingdale State, Hofstra, Suffolk CC Also to Participate on May 23***

STONY BROOK, N.Y., May 19, 2005—An engineering competition between teams comprised of students from Stony Brook University, Farmingdale State, Hofstra, and Suffolk Community College will take place on Monday, May 23 at the Charles B. Wang Center on the Stony Brook campus. The competition will begin at 2:00 PM in Room 301.

Four mixed teams—made up of one student from each of the four institutions—will compete in the Dare to Attempt/Risk Entrepreneurship (DARE) Engineering event, working on projects relating to technology entrepreneurship such as wireless health monitoring and creating a platform to improve campus security. Students will present prototypes of their innovative devices and business plans for promotion of their products. The competition will be judged on the basis of entrepreneurial, technical and societal impact of these projects. The winning five-member team will split the first prize of \$1000 for each student of the team.

The event is sponsored by the Sensor Consortium in the Department of Electrical and Computer Engineering, in Stony Brook's College of Engineering and Applied Sciences.

Our first year experience and Consortium plans for the next year

The experience of this year drastically changed some of our views on Consortium activity and dispelled many of our illusions. A typical of this illusions was that people in business community will pay a benevolent attention to Consortium letters and emails asking for participation and help with our projects. In the course of the year we painfully realized that business people are busy and do not pay a slightest attention to our impersonal pleas. However, a personal interaction, a visit or a well-prepared phone call, can work miracles. Some of the business people we contacted, when they understand the Consortium purpose of the business and entrepreneurial education, are magnanimous with their time. A good example of such people is John Pyrovolakis who helped us with his advice and time many times in the course of our first founding year.

Paper to summarize our experience. We are working on a paper to relate our first year follies and successes to the engineering audience. The paper will be co-authored by all Consortium staff members. We selected *the Journal of the Engineering Education* as a most suitable periodical.

Changes in the educational curriculum. Experience of the first year has demonstrated that the Course on the Entrepreneurship given last year is too abstract and remote from the actual

projects. That is why we shall change the structure of the course. The academic part of the first semester will be left relatively unchanged, but in the second semester a practical part will be added. It will include a business plan writing and discussions with the Small Business Development Center at Stony Brook University (the SBDC should eventually endorse each business plan), under the guidance of Prof. Wolf.

We shall also adjust the timing and structure of the Competition event. Instead of late May, after final exams, it makes a better sense to run the Competition in middle April. Thus the project advisors will be able to better evaluate students' contribution and their grades. The structure of the Competition will be adjusted in that all E-Team project presentation will have one format: the technical part with E-Teams at their stands presenting their product to judges, possibly including a video with technical details. And the business part with the business plan presentation. Another change is instructions to the judges prior to the Competition in using the project evaluation criteria.